

Notes on the spider genus *Oedothorax* Bertkau, 1883 with description of eleven new species from India (Linyphiidae: Erigoninae)

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Abstract: Eleven new species of *Oedothorax* Bertkau in Förster & Bertkau, 1883, are described from several parts of India: West Bengal (Himalayas): *Oedothorax cornutus* sp. nov. (♂ & ♀), *O. falciferoides* sp. nov. (♂), *O. lopchu* sp. nov. (♂) and *O. villosus* sp. nov. (♂ & ♀); Meghalaya: *O. meghalaya* sp. nov. (♂) and *O. uncus* sp. nov. (♂ & ♀); Madras (currently Tamil Nadu): *O. cinur* sp. nov. (♂ & ♀), *O. kodaikanal* sp. nov. (♂ & ♀), *O. paracymbialis* sp. nov. (♂) and *O. rusticus* sp. nov. (♂ & ♀); Kerala: *O. stylus* sp. nov. (♂ & ♀). Based on the new finds, the *Oedothorax* fauna of the Himalayas is known to comprise no less than 27 species, and is thus richer than the remaining Palearctic (22 species). This shows that the Himalayas represent a significant centre of *Oedothorax* speciation, its species apparently being most closely related to those of the Oriental realm. It is the Himalayas that seem to have supplied faunal elements to the Oriental region.

Keywords: Arachnida - Araneae - Himalayas - West Bengal - Madras - Kerala.

INTRODUCTION

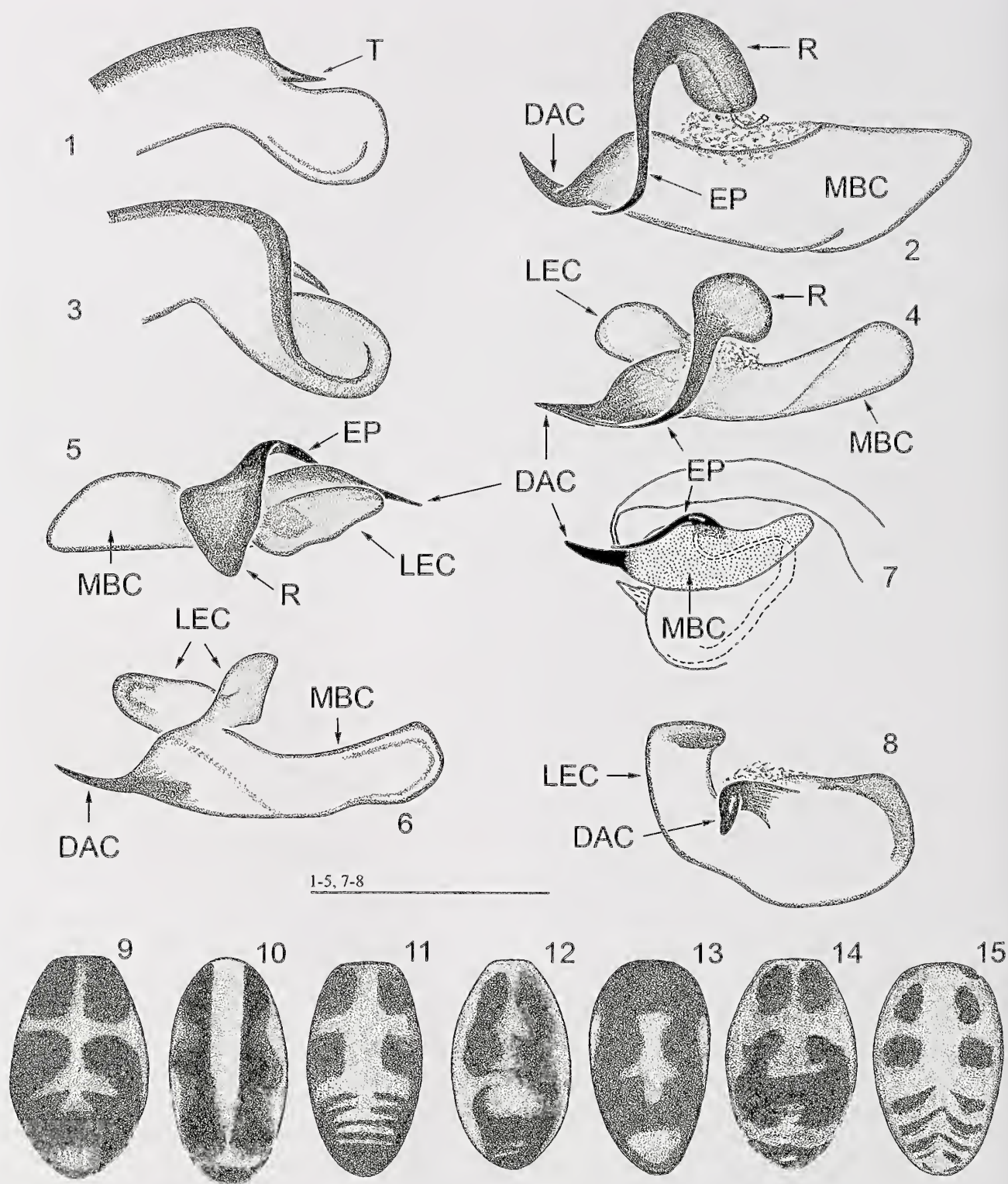
The genus *Oedothorax* is a rather large genus which contains 61 species (World Spider Catalog, 2015). However, when ignoring of the dubious species, including some described from females alone, this diversity is reduced by about one-third.

The genus is characterized by the same formula of chaetotaxy (2.2.1.1), the presence of a trichobothrium on metatarsus IV, and the position of the trichobothrium in the distal half of metatarsus I. Usually the males can easily be distinguished by a modified carapace and by the shape of the palpal tibia, both often highly peculiar. In contrast, the genital organs in many species are very similar even in congeners from different zoogeographical realms (Fig. 2 cf. Fig. 7). In males, the distal suprategular apophysis is not modified and it is characterized by the presence of a pointed tooth ("T" in Fig. 1) in the middle. The embolic division in all congeners consists of two sclerites: embolus and convector [the latter term after Tanasevitch (1998), or "lamella" after Merrett (1963)]. The embolus usually has a small radix and a curved, relatively short embolus proper. In length the latter normally fails to exceed the convector, the shape of which is quite varied, often also species-specific (see Tanasevitch, 2014a, b). As a rule, the convector, or rather its main body ("MBC" in Figs 2, 4-7), is elongated in longitudinal direction and shows a distal apophysis varying in shape ("DAC" in Figs 2, 4-8).

This apophysis is usually dark to black, sclerotized, often pointed. Some species, especially the numerous ones from the Himalayas, have a peculiar lateral extension on the convector ("LEC" in Figs 4-6, 8). In most cases embolus and convector are connected to each other by a translucent membranous tissue. Sometimes this tissue shows varying degrees of sclerotization, then giving both sclerites the appearance of a single sclerite. The duct leading from the distal suprategular apophysis runs inside the embolus bypassing the convector.

The epigynes are very simple and, like the embolic division in the males, are very similar to each other. They are composed of a median plate (= ventral plate *auct.*), the lateral borders of which are not always clear, and of spherical or elongated receptacles which are translucent on both sides of the plate.

This paper presents descriptions of 11 new species of *Oedothorax* from different parts of India: Four species are from the Himalayas (West Bengal), two species are from a small mountain massif situated close to the foot of the Himalayas, in Meghalaya. Five species are reported from southern India: Madras (currently Tamil Nadu) and Kerala. All of the new species are montane, occurring at 900-2600 m a.s.l., and like other Himalayan and Oriental *Oedothorax* species differ from the Palearctic congeners by the presence of a well-expressed dorsal abdominal pattern in both sexes (Figs 9-15).



Figs 1-15. Male palp details (1-8) and abdominal patterns in dorsal view (9-15) in *Oedothorax* spp. (1, 3) Distal suprategular apophysis. (2, 4, 5, 7) Embolic division, different views. (6, 8) Convector, lateral and frontal views, respectively. (1-2) *O. gibbosus* (Blackwall, 1841), type species, specimen from Moscow, Russia. (3-6) *O. meridionalis* Tanasevitch, 1987, specimen from Naryn, Tian-Shan Mts, Kyrgyzstan. (7) *O. nazareti* Scharff, 1989, Shoa Prov., Ethiopia, after Scharff (1989). (8) *O. rusticus* sp. nov. (9) *O. savigniformis* Tanasevitch, 1998. (10) *O. assuetus* Tanasevitch, 1998. (11) *O. sexocolorum* Tanasevitch, 1998. (12) *O. clypeellum* Tanasevitch, 1998. (13) *O. simplicithorax* Tanasevitch, 1998. (14) *O. falcifer* Tanasevitch, 1998. (15) *O. coronatus* Tanasevitch, 1998, all from Nepal, after Tanasevitch (1998). Figures 6, 9-15 not to scale.

MATERIAL AND METHODS

This paper is based on material from India that is kept at the Muséum d'histoire naturelle de Genève, Switzerland (MHNG). If not mentioned otherwise, the material examined is deposited in the MHNG; some paratypes are placed in the collection of the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU). Sample numbers are given in square brackets.

The terminology of copulatory organs mainly follows that of Tanasevitch (1998, 2014a, b) and Hormiga (2000). The chaetotaxy of Erigoninae is given in a formula, e.g., 2.2.1.1.1, which refers to the number of dorsal spines on tibiae I-IV. As far as possible, paratypes were used for descriptions and measurements to avoid damage of body, legs, setae, etc. in the holotypes. The sequence of leg segment measurements is as follows: femur + patella + tibia + metatarsus + tarsus. All measurements are given in mm. Scale lines in the figures correspond to 0.1 mm unless indicated otherwise. Figure numbers are given above the scale lines, the alternative distance below. Specimens preserved in 70% ethanol were studied using a MBS-9 stereomicroscope and a Wild compound microscope. A Levenhuk C-800 digital camera was used for some drawings. Images of multiple focal sections were combined using Helicon Focus image stacking software, version 5.1.

Abbreviations

The following abbreviations are used in the text and figures:

| | |
|--------|--|
| a.s.l. | Above sea level |
| D | Duct |
| DAC | Distal apophysis of convector |
| DSA | Distal supratregular apophysis |
| E | Embolus |
| EP | Embolus proper |
| Fe | Femur |
| LEC | Lateral extension of convector |
| MBC | Main body of convector |
| MNHG | Muséum d'histoire naturelle de Genève |
| Mt | Metatarsus |
| P | Paraembium |
| R | Radix |
| Re | Receptacle |
| T | Tooth on DSA |
| Ti | Tibia |
| TmI | Position of trichobothrium on metatarsus I |

TAXONOMIC PART

Oedothorax cornutus sp. nov.

Figs 16-25

Holotype: Male; INDIA, Himalayas, West Bengal, Darjeeling Distr., Tigerhill, 2500-2600 m a.s.l., near top, sifting in forest; 18.X.1978; leg. C. Besuchet & I. Löbl [#19].

Paratype: 1 female, collected together with the holotype.

Diagnosis: The new species can be easily distinguished from other congeners by the peculiar shape of the male carapace, which bears a pair of thick, shot, appressed horn-like setae, as well as by the presence of a rounded postocular elevation on the carapace, separated from the head part by a deep slit.

Etymology: The specific name is a Latin adjective, meaning "horned", referring the presence of a pair horn-like setae on a head of the male carapace.

Description: Male (holotype). Total length 1.95. Carapace 0.90 long, 0.70 wide, pale brown. Cephalic part of carapace bearing a pair of thick, short, appressed to a head horn-like setae; a pale, yellow, rounded, postocular elevation being separated from cephalic part by a deep slit (Figs 16-18). Chelicerae 0.35 long, unmodified. Legs pale brown, almost yellow. Leg I 2.78 long (0.75+0.23+0.70+0.65+0.45), IV 2.91 long (0.85+0.20+0.73+0.75+0.38). Chaetotaxy: spines mostly lost, should be 2.2.1.1. TmI 0.87. All metatarsi with a trichobothrium. Palp (Figs 19-24): Tibia with a strong claw-shaped apophysis apically, at right angle to axis of segment. Paracymbium relatively small, hook-shaped. Distal supratregular apophysis flat, truncated apically, with a small, sharp tooth in middle. Embolus small, bent at 90°, its radical part slightly expanded. Convector elongated, narrow, almost straight, with a flat, narrow, flag-shaped lateral extension distally. Abdomen 1.13 long, 0.68 wide, dorsally pale, with a pair of grey spots in anterior part and with a herring-bone pattern posteriorly.

Female. Total length 2.03. Carapace 0.93 long, 0.65 wide, pale brown, unmodified. Chelicerae 0.38 long, unmodified. Legs yellow. Leg I 2.94 long (0.83+0.25+0.73+0.68+0.45), IV 3.09 long (0.83+0.25+0.75+0.83+0.43). Chaetotaxy 2.2.1.1, length of spines 1.5-2 times diameter of segment long. All metatarsi with a trichobothrium. TmI 0.82. Abdomen 1.13 long, 0.80 wide, dorsally pale, with two pairs of grey paramedian spots in anterior part, and with three pairs of short narrow transversal stripes posteriorly. Epigyne as in Fig. 25: median plate with inclined lateral sides, receptacles spherical.

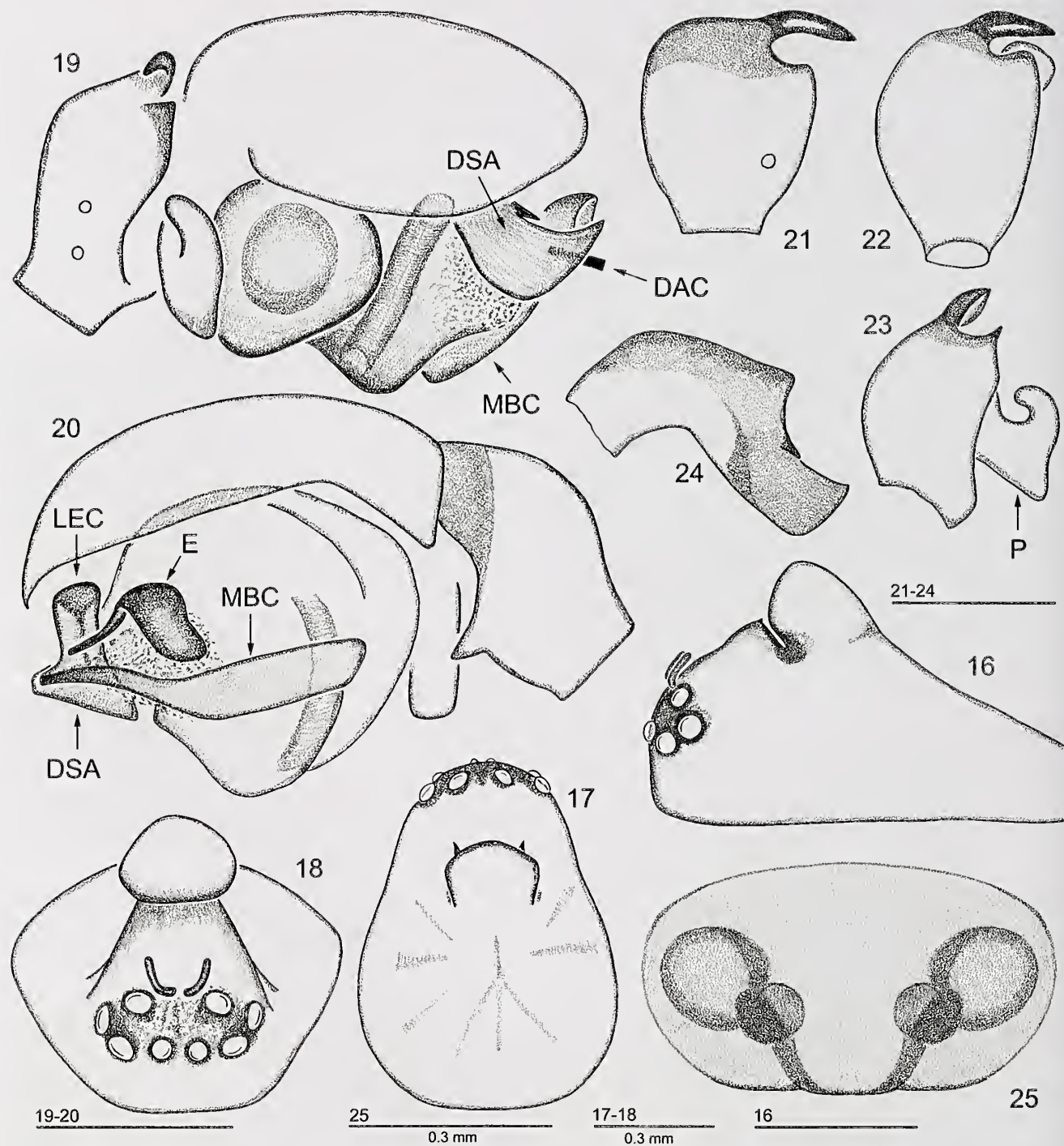
Taxonomic remarks: The new species is similar to *O. villosus* sp. nov. (see below).

Distribution: Only known from the type locality.

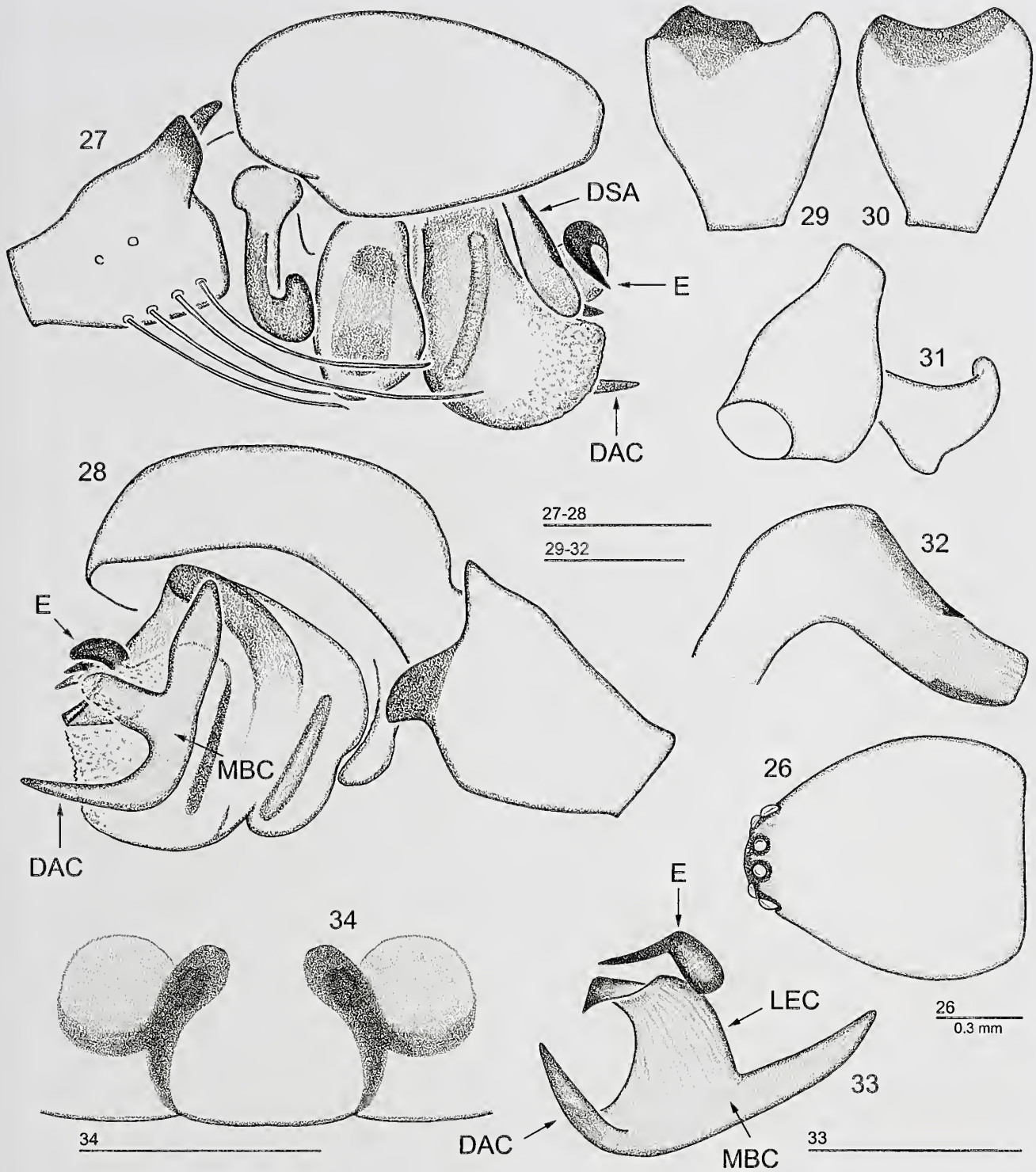
Oedothorax cunur sp. nov.

Figs 26-34

Holotype: Male; INDIA, Madras, Nilgiri, Coonoor, 1600 m a.s.l., sifting in forest below town; 22.XI.1972; leg. C. Besuchet & I. Löbl [#43].



Figs 16-25. *Oedothorax cornutus* sp. nov., male holotype (16-24), female paratype (25). (16-18) Carapace, lateral, dorsal and frontal views, respectively. (19-20) Right palp, retro- and prolateral views, respectively. (21-22) Palpal tibia, dorsal view, different aspects. (23) Palpal tibia and paracymbium, caudal-retrolateral view. (24) Distal suprategular apophysis. (25) Epigyne, ventral view.



Figs 26-34. *Oedothorax cumur* sp. nov., male holotype (26-33), female paratype (34). (26) Carapace, dorsal view. (27-28) Right palp, retro- and prolateral views, respectively. (29-30) Palpal tibia, dorsal views, different aspects. (31) Palpal tibia and paracymbium, caudal-retrolateral view. (32) Distal suprategular apophysis. (33) Embolic division. (34) Epigyne, ventral view.

Paratype: 1 female, collected together with the holotype.

Diagnosis: The species is characterized by the unmodified carapace and palpal tibia, by the massive, distally membranous tegulum and by the specific shape of the convector in the male, as well as by the small value of TmI in both sexes.

Etymology: The specific name is a noun in apposition, consonant with the name of the locality where the species was collected.

Description: Male (holotype). Total length 2.00. Carapace 1.00 long, 0.88 wide, pale brown, unmodified, eyes normal (Fig. 26). Chelicerae 0.40 long, unmodified. Legs yellow. Leg I 3.74 long ($1.00+0.28+0.95+0.88+0.63$), IV 3.83 long ($1.03+0.30+1.00+1.00+0.50$). Chaetotaxy: spines mostly lost, but should be 2.2.1.1. All metatarsi with a trichobothrium. TmI 0.49. Palp (Figs 27-33): Tibia with a shallow invagination apically and a flat twin-cone outgrowth displaced to prolateral side. Paracymbium simple, hook-shaped. Tegulum expanded in distal part, membranous. Distal supratregular apophysis with almost parallel edges, bearing a small pointed tooth in middle. Embolus small, curved, its radical part slightly expanded. Main body of convector long and narrow; distal apophysis bent at 90° to axis of segment, long, narrowing gradually. Lateral extension wide and flat, slightly curved distally. Abdomen 1.15 long, 0.73 wide, dorsally pale, almost white, with a pair of grey spots in anterior part, and with interrupted transverse stripes posteriorly.

Female. Total length 2.18. Carapace 1.05 long, 0.83 wide. Chelicerae 0.45 long, unmodified. Leg I 3.31 long ($0.88+0.30+0.83+0.75+0.55$), IV 3.41 long ($0.85+0.28+0.88+0.90+0.50$). Chaetotaxy: 2.2.1.1, length of spines 1-2 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.64. Abdomen 1.33 long, 0.85 wide. Epigyne as in Fig. 34: median plate with gradually curved lateral sides, receptacles spherical. Body and leg coloration as in male.

Distribution: Only known from the type locality.

Oedothorax falciferoides sp. nov.

Figs 35-43

Holotype: Male; INDIA, Himalayas, West Bengal, Darjeeling Distr., Mahanadi near Kurseong, southern slope, 1200 m a.s.l., sifting in forest; 19.X.1978; leg. C. Besuchet & I. Löbl [20].

Diagnosis: The new species is characterized by the peculiar shape of the male carapace, by the small embolus with strongly reduced embolus proper and by the specific structure of the convector.

Etymology: The specific name refers to the resemblance with the Nepalese *O. falcifer* Tanasevitch, 1998.

Description: Male (holotype). Total length 1.75. Carapace 0.85 long, 0.68 wide, pale brown, cephalic part with a small elevation bearing large posterior median eyes (Figs 35-37). Chelicerae 0.33 long, unmodified. Legs pale brown. Leg I 3.13 long ($0.80+0.25+0.75+0.80+0.53$), IV 3.16 long ($0.85+0.23+0.77+0.83+0.48$). Chaetotaxy 2.2.1.1, length of spines 1.5-2.5 times diameter of segment. Metatarsal trichobothrium not found on any legs. Palp (Figs 38-43): Tibia short, with narrow, long, stiletto-like apical apophysis directed retrolaterally. Paracymbium small, hook-shaped. Distal supratregular apophysis wide, flat, with two dark folds. Radical part of embolus very small, drop-shaped, embolus proper strongly reduced. Convector with a massive body, lateral extension narrow, directed forward, distal apophysis awl-shaped. Abdomen 0.95 long, 0.55 wide, with indistinct, irregular, grey pattern. Female unknown.

Taxonomic remarks: This species is most similar to *O. falcifer* Tanasevitch, 1998, known from Ilam District, Nepal (Tanasevitch, 1998), but differs by its small cephalic elevation on the carapace, by its wider stiletto-like tibial apophysis, as well as by the reduced embolus proper.

Distribution: Only known from the type locality.

Oedothorax kodaikanal sp. nov.

Figs 44-50

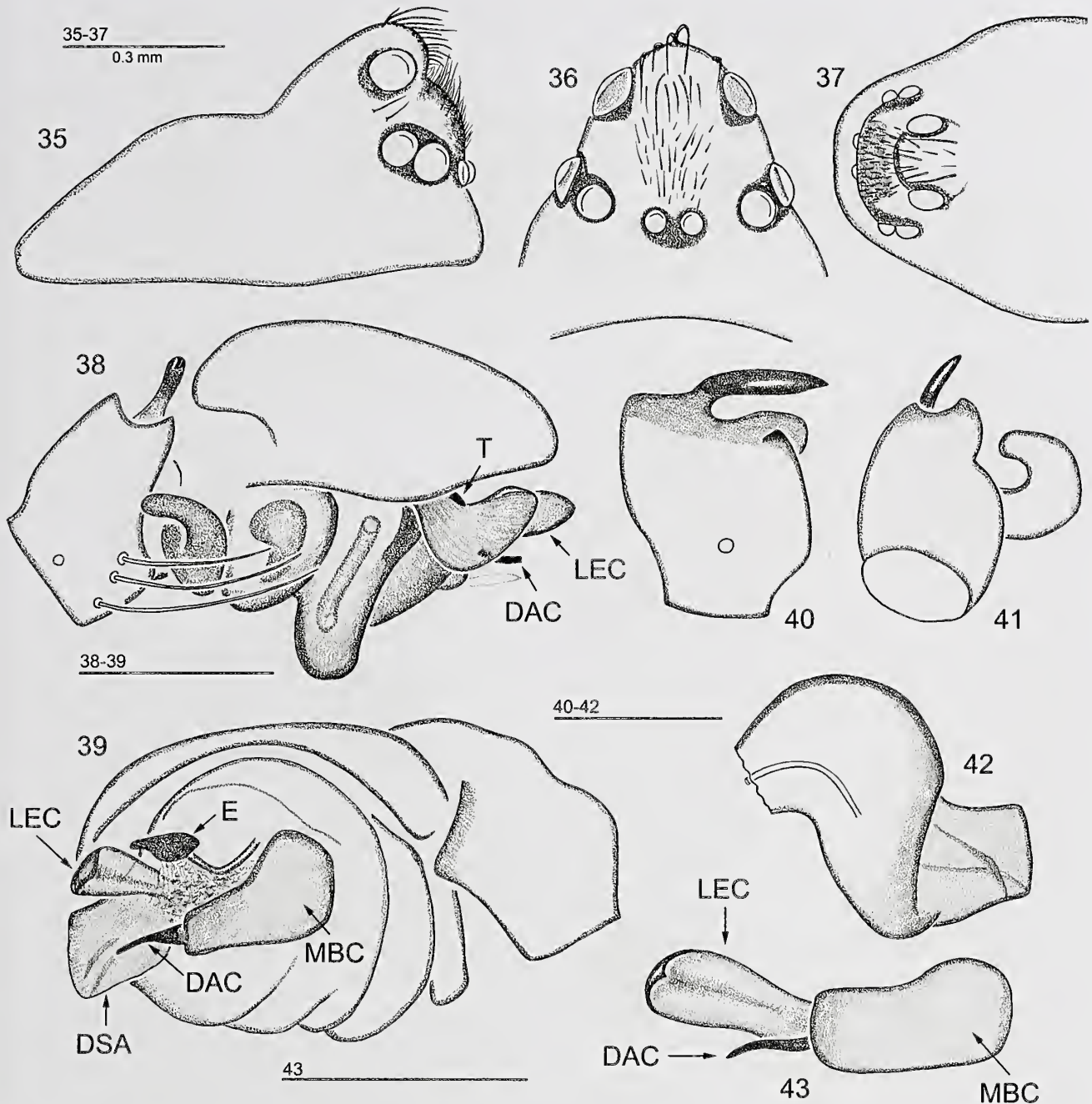
Holotype: Male; INDIA, Madras, Palni Hills, 10 km NW of Kodaikanal, 2150 m a.s.l., edge of *Rhododendron* forest with fern, sifting litter near river; 15.XI.1972; leg. C. Besuchet & I. Löbl [1972/27].

Paratype: 2 males, one of them in ZMMU; Madras, Palni Hills, 23 km W of Kodaikanal, Lake Berijam, 2150 m a.s.l., *Rhododendron* forest, sifting litter; 14.XI.1972; leg. C. Besuchet & I. Löbl [1972/26].

Diagnosis: Males of the new species can be easily recognized by the unmodified carapace, the hypertrophied lateral extension of the convector which projects from the apex of the palp, as well as by the band-like embolus.

Etymology: The specific name is a noun in apposition taken from the name of the type locality.

Description: Male (holotype). Total length 2.30. Carapace 1.20 long, 0.85 wide, unmodified, pale brown; eyes normal (Fig. 44). Chelicerae 0.45 long, unmodified. Legs yellow. Leg I 3.78 long ($1.05+0.30+0.93+0.88+0.62$), IV 3.88 long ($1.07+0.30+0.93+0.98+0.60$). Chaetotaxy 2.2.1.1,



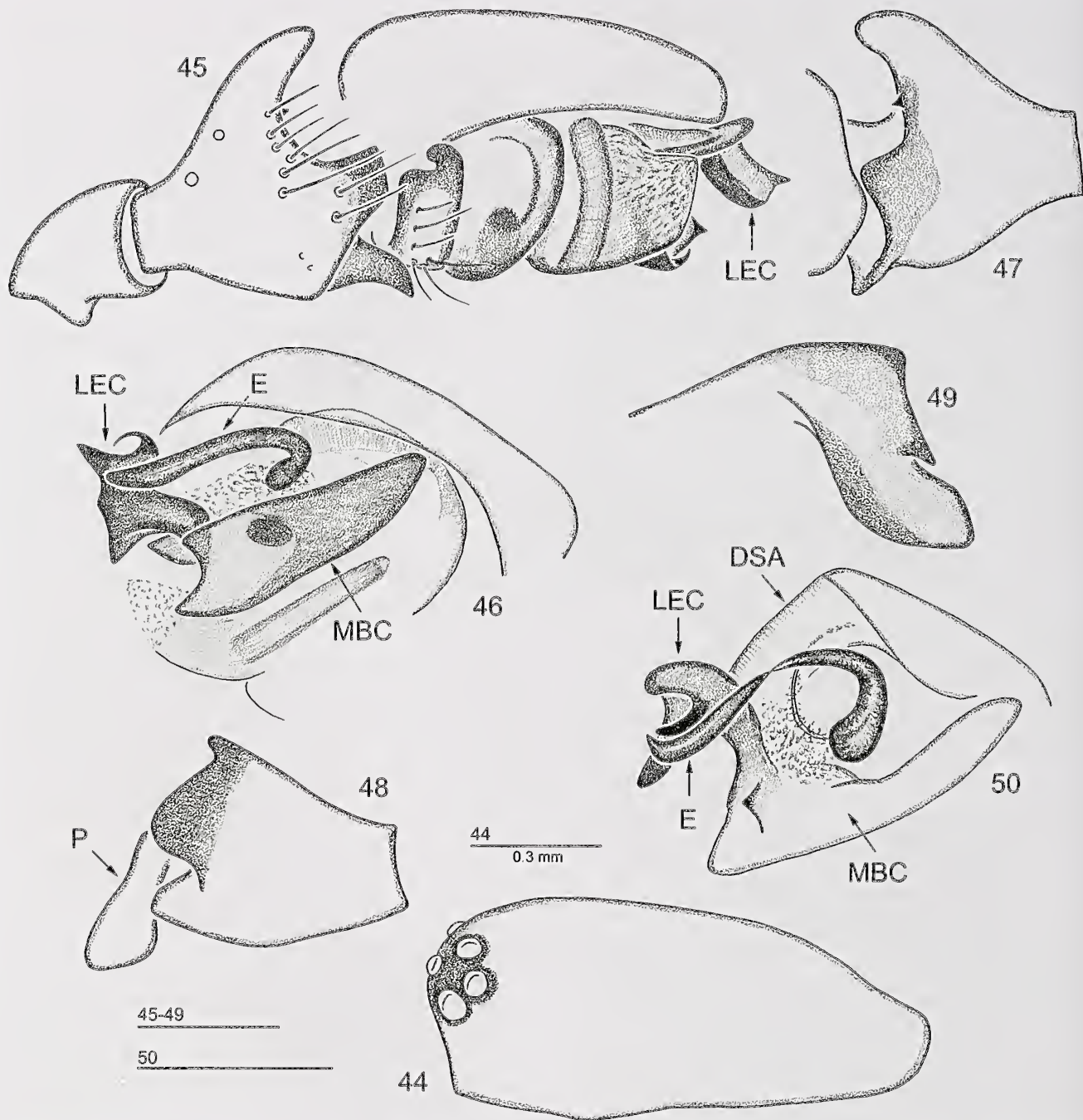
Figs 35-43. *Oedothorax falciferoides* sp. nov., male holotype. (35-37) Carapace, lateral, frontal and dorsal views, respectively. (38-39) Right palp, retro- and prolateral views, respectively. (40) Palpal tibia, dorsal view. (41) Palpal tibia and paracymbium, caudal-retrolateral view. (42) Distal suprategular apophysis. (43) Convector.

spines stout, their length 1.5-2.5 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.52. Palp (Figs 45-50): Tibia with a conical dorsal outgrowth and a truncated retrolateral extension. Prolateral edge of tibia with a small pointed tooth. Paracymbium small, L-shaped. Tegulum membranous distally. Embolic division with a small radix and a relatively long, wide, flat embolus. Main body of convector massive, with a well-sclerotized lateral extension of complex form directed forward. Abdomen 1.33 long, 0.80 wide,

dorsally pale, with two pairs of grey paramedian spots in anterior part and with transverse stripes posteriorly. Female unknown.

Variability: The retrolateral tibial outgrowth can be somewhat shorter, the prolateral tibial tooth can be slightly larger than in the holotype.

Distribution: Only known from high altitudes of the Palni Hills in Madras (currently Tamil Nadu), India.



Figs 44-50. *Oedothorax kodaikanal* sp. nov., male holotype. (44) Carapace, lateral view. (45-46) Right palp, retro- and pro-lateral views, respectively. (47) Palpal tibia, pro-lateral view. (48) Palpal tibia and paracymbium, ventral view. (49) Distal suprategular apophysis. (50) Distal suprategular apophysis and embolic division.

***Oedothorax lopchu* sp. nov.**

Figs 51-60

Holotype: Male; INDIA, Himalayas, West Bengal, Darjeeling Distr., between Ghoom and Lopchu, 13 km from Ghoom, northern slope, 2000 m a.s.l., sifting in forest; 14.X.1978; leg. C. Besuchet & I. Löbl [#14b].

Paratype: 1 male, collected together with the holotype. – 1 male; same locality; 12.X.1978; leg. C. Besuchet & I. Löbl [#12].

Diagnosis: The species is characterized by its slightly modified male carapace, by the shape of the main body of the convector, as well as by the relatively long embolus.

Etymology: The specific name is a noun in apposition taken from the name of the type locality.

Description: Male (paratype). Total length 1.95. Carapace 0.93 long, 0.75 wide, reddish brown with indistinct grey radial stripes. Anterior part of carapace

slightly elevated, eyes enlarged (Fig. 51). Chelicerae 0.37 long, unmodified. Legs pale brown. Leg I 3.91 long ($0.98+0.25+0.98+0.95+0.75$), IV 3.74 long ($1.00+0.25+0.98+0.98+0.53$). Chaetotaxy 2.2.1.1, length of spines 1.5-2 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.53. Palp (Figs 52-60): Tibia short, with a narrow, long, claw-shaped apical apophysis directed retrolaterally. Paraembium small, hook-shaped. Distal suprategular apophysis wide, flat, with a sharp tooth in middle. Embolus relatively long, curved. Main body of convector elongated, with a deep invagination medially; lateral extension flat, constricted basally; distal apophysis narrow, pointed, strongly sclerotized, slightly curved. Abdomen 1.08 long, 0.65 wide, dorsally pale, with three pairs of indistinct, large, grey spots. Female unknown.

Distribution: Only known from the type locality.

Oedothorax meghalaya sp. nov.

Figs 61-69

Holotype: Male; INDIA, Meghalaya, above Shillong, Khasi Hills, near Shillong Peak, northern slope, 1850-1950 m a.s.l., primary forest, sifting litter; 25.X.1978; leg. C. Besuchet & I. Löbl [1978/27].

Paratype: 1 male, collected together with the holotype.

Etymology: The specific name is a noun in apposition taken from the name of the type locality.

Diagnosis: The new species is easily recognized among other congeners by the specific dorsal outgrowth on the palpal tibia, as well as by the wide distal apophysis of the convector terminating in two stylet-like projections on its edges.

Description: Male (paratype). Total length 2.15 (2.23 in holotype). Carapace 1.00 long, 0.75 wide, pale brown with greyish sides, cephalic elevation bearing posterior median eyes (Figs 61-62). Chelicerae 0.38 long, unmodified. Legs pale brown. Leg I 3.73 long ($1.00+0.25+0.93+0.93+0.62$), IV 3.85 long ($1.02+0.25+1.00+1.00+0.58$). Chaetotaxy 2.2.1.1, length of spines 1.5-2.5 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.61. Palp (Figs 63-69): Tibia with a dorsal vertical outgrowth narrowing and curved distally. Paracymbium large, distal part bearing several small spines. Distal suprategular apophysis short, truncated, with obtuse tooth in middle. Radix small, embolus proper strong, almost straight. Distal apophysis of convector broad, with two sharp projections on its edges. Abdomen 1.25 long, 0.80 wide, dorsally pale, with three pairs of large, grey paramedian spots merged into two longitudinal stripes. Female unknown.

Distribution: Only known from the type locality.

Oedothorax paracymbialis sp. nov.

Figs 70-74

Holotype: Male; INDIA, Madras, Nilgiri, Hulical near Coonoor, right bank of Coonoor River, 1600 m a.s.l., forest in ravine, sifting; 22.XI.1972; leg. C. Besuchet & I. Löbl [#44].

Diagnosis: The new species is well distinguished by the peculiar shape of the palpal tibia and of the paracymbium, as well as by the reduced lateral extension of the convector.

Etymology: The specific name, an adjective, refers to the peculiar shape of the paracymbium.

Description: Male (holotype). Total length 1.68. Carapace 0.73 long, 0.63 wide, bright yellow. Cephalic part of carapace with a small elevation behind eye group bearing a curved spine directed forward (Fig. 70). Eyes slightly enlarged. Chelicerae 0.25 long, unmodified. Legs pale yellow. Leg I 3.20 long ($0.90+0.25+0.80+0.75+0.50$), IV 3.09 long ($0.85+0.23+0.83+0.80+0.38$). Chaetotaxy 2.2.1.1, length of spines 1.5-2 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.58. Palp (Figs 71-74): Tibia with a conical outgrowth apically. Distal part of paracymbium massive, claw-shaped terminally. Distal suprategular apophysis rounded, with a sharp tooth in middle. Radical part of embolus somewhat expanded, embolus relatively long, curved. Main body of convector elongated, narrow, slightly curved, its distal part strongly sclerotized, twisted; lateral extension reduced. Abdomen 1.03 long, 0.65 wide, dorsally pale, with grey herring-bone pattern. Female unknown.

Distribution: Only known from the type locality.

Oedothorax rusticus sp. nov.

Figs 8, 75-82

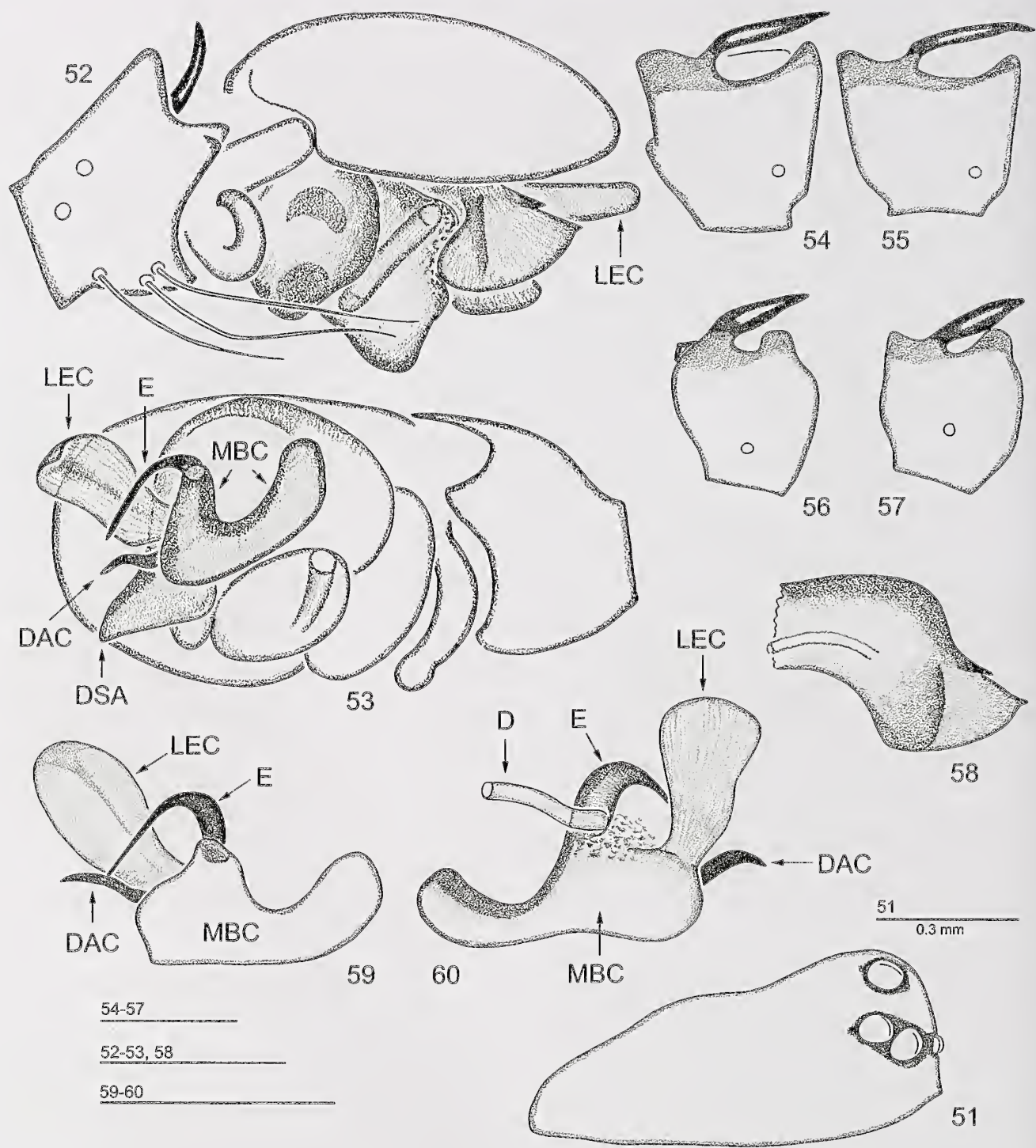
Holotype: Male; INDIA, Madras, Palni Hills, Kodaikanal, 2100 m a.s.l., sifting in forest above town; 11.XI.1972; leg. C. Besuchet & I. Löbl [#22].

Paratypes: 3 males, 8 females (1 male and 1 female in ZMMU) collected together with the holotype.

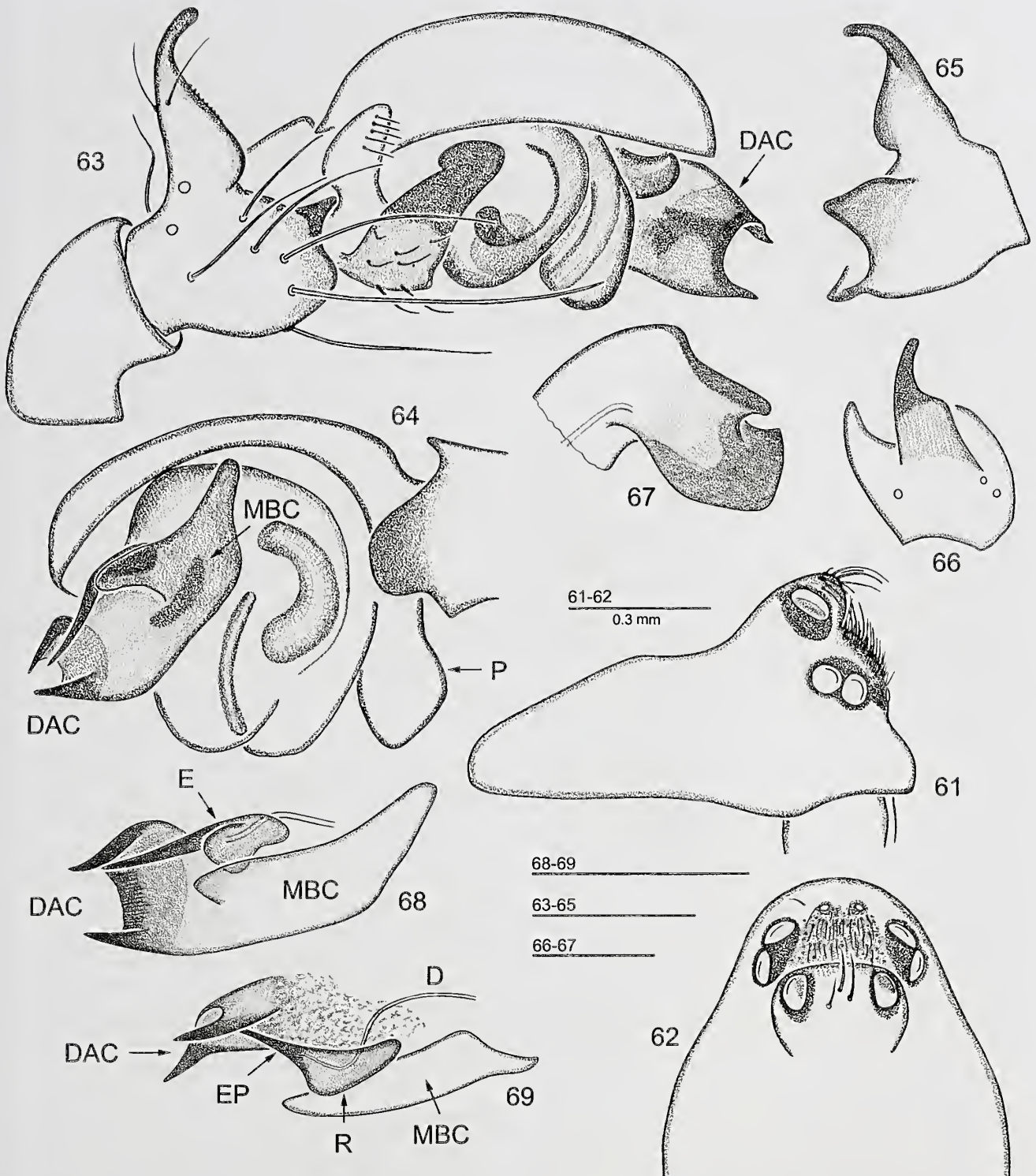
Diagnosis: Males of the new species are characterized by the slightly modified carapace, by the spination of the paracymbium, as well as by the specific structure of the convector.

Etymology: The specific name is a Latin adjective meaning "simple, unpretentious" referring to the ordinary structure of the genitalia in this species.

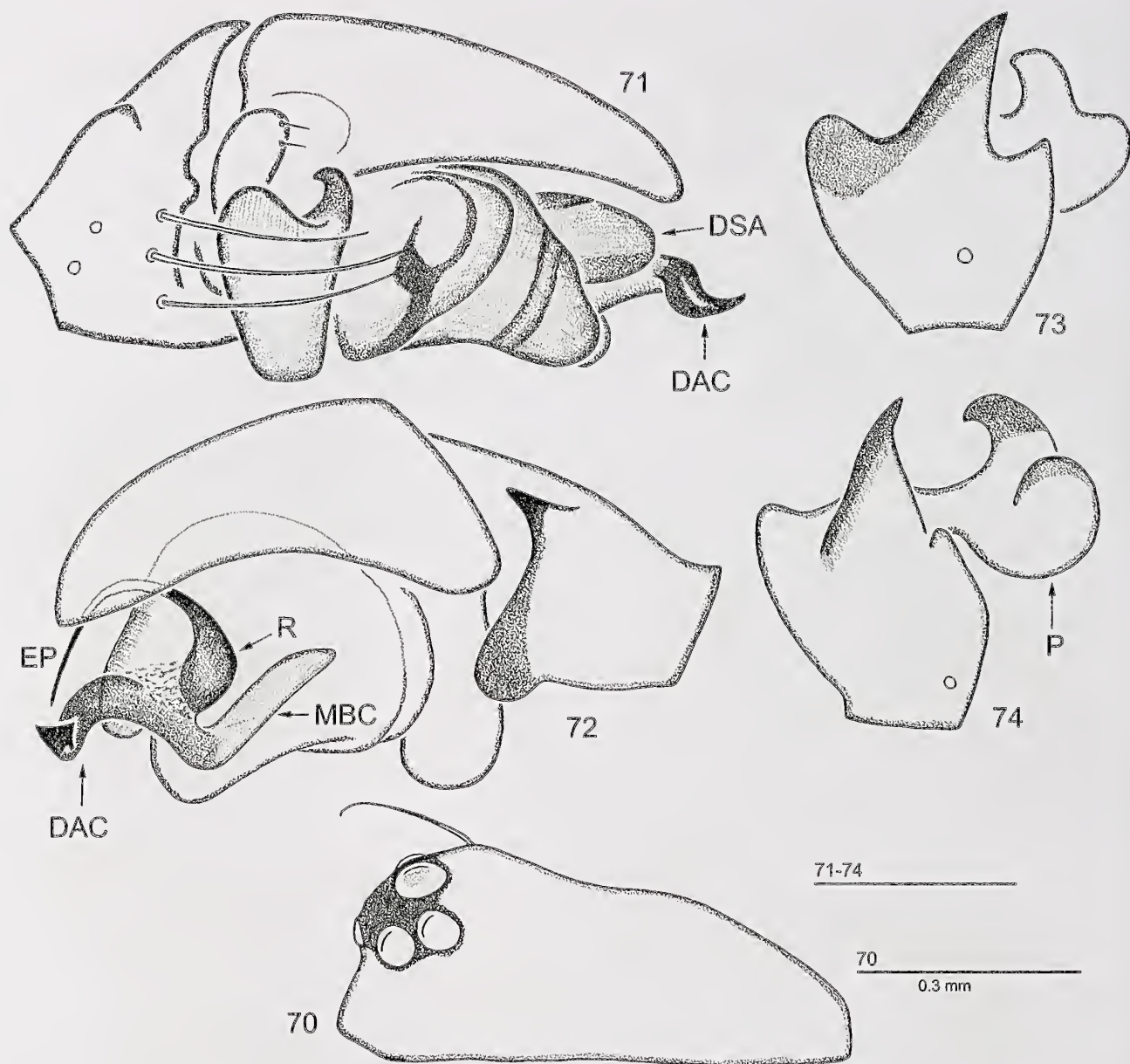
Description: Male (paratype). Total length 2.00 (1.93, 2.00, 2.13 in other paratypes). Carapace 0.90 long, 0.75 wide, pale brown, with indistinct grey



Figs 51-60. *Oedothorax lopchu* sp. nov., male paratype. (51) Carapace, lateral view. (52-53) Right palp, retro- and prolateral views, respectively. (54-57) Palpal tibia, dorsal view, different aspects. (58) Distal suprategular apophysis. (59-60) Embolic division, different aspects.



Figs 61-69. *Oedothorax meghalaya* sp. nov., male paratype. (61-62) Carapace, lateral and dorsal views, respectively. (63-64) Right palp, retro- and prolateral views, respectively. (65-66) Palpal tibia, prolateral and dorsal views, respectively. (67) Distal supratregular apophysis. (68-69) Embolic division, different aspects.



Figs 70-74. *Oedothorax paracymbialis* sp. nov., male holotype. (70) Carapace, lateral view. (71-72) Right palp, retro- and prolateral views, respectively. (73-74) Palpal tibia and paracymbium, caudal-retrolateral view, different aspects.

radial stripes. Cephalic part of carapace moderately elevated, eyes somewhat enlarged (Fig. 75). Chelicerae 0.35 long, unmodified. Legs yellow. Leg I 3.56 long ($0.95+0.25+0.93+0.88+0.55$), IV 3.61 long ($1.00+0.23+0.93+0.95+0.50$). Chaetotaxy 2.2.1.1, spines stout, their lengths 1.5-2.5 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.67. Palp (Figs 8, 76-80): Tibia with a strong, stiletto-like apical apophysis directed retrolaterally. Paracymbium simple, its distal part bearing several short, curved spines. Distal suprategular apophysis constricted in middle, bearing a small sharp tooth at constriction, rounded distally. Embolus small, bent at 90° , its radical

part slightly expanded. Convector with a massive lateral extension, distal apophysis strongly sclerotized, twisted. Abdomen 1.13 long, 0.75 wide, dorsally pale, with a longitudinal row of three pairs of large grey spots. Female. Total length 2.33 (2.00, 2.15 in two other paratypes). Carapace 0.98 long, 0.78 wide, unmodified. Chelicerae 0.40 long, unmodified. Leg I 3.57 long ($0.95+0.28+0.93+0.83+0.58$), IV 3.81 long ($1.05+0.30+0.98+0.95+0.53$). TmI 0.73. Abdomen 1.35 long, 0.75 wide. Epigyne as in Figs 81-82: median plate with gradually curved lateral sides, receptacles spherical. Body and leg coloration, as well as chaetotaxy, as in male.

Taxonomic remarks: The new species is similar to *O. cornutus* sp. nov. and *O. villosus* sp. nov., but differs clearly by the unmodified carapace and by the spination of the paracymbium in males, as well as by the gradually curved lateral sides of the median plate in females. The shape of the epigyne is ordinary for the genus and somewhat similar to the geographically adjacent *O. cunur* sp. nov.

Distribution: Only known from the type locality.

***Oedothorax stylus* sp. nov.**

Figs 83-85

Holotype: Male; INDIA, Kerala, NW of Nelliampathi Hills, Kaikatty, 900 m a.s.l.; sifting in forest, near a spring; 30.XI.1972; leg. C. Besuchet & I. Löbl [1972/58].

Paratype: 1 female, collected together with the holotype. – 1 male; Madras, Anaimalai Hills, 18 km N of Valparai, 1250 m a.s.l., forest, sifting litter; 18.XI.1972; leg. C. Besuchet & I. Löbl [1972/35].

Diagnosis: The new species is characterized by lacking apophyses on the palpal tibia, by the long, straight and thin distal apophysis of the convector in males. Females can be easily distinguished by the presence of narrow, long, parallel, sclerotized stripes on the cuticle at both sides of the epigyne.

Etymology: The species name is a Latin noun; one of its many meanings is “awl” which refers to the shape of the distal apophysis of the convector.

Description: Male (holotype). Carapace 0.80 long, 0.65 wide, unmodified, pale yellow. Eyes slightly enlarged. Chelicerae 0.28 long, unmodified. Legs yellow. Leg I 2.58 long (0.70+0.23+0.60+0.60+0.45), IV 2.58 long (0.70+0.23+0.62+0.65+0.38). Chaetotaxy 2.2.1.1, length of spines 1.5-2.5 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.53. Palp (Figs 83-84): Tibia lacking any apophyses, bearing small denticles terminally on dorsal side. Paraembium small, L-shaped. Embolus very small, embolus proper thin and short. Distal part of convector thin, long, awl-shaped. Abdomen lost. Dorsal abdominal pattern of male paratype consisting of two pairs of grey paramedian spots in anterior part and interrupted transverse stripes posteriorly.

Female. Total length 2.00. Carapace 0.83 long, 0.63 wide, pale brown, unmodified. Eyes slightly enlarged. Chelicerae 0.38 long, unmodified. Legs yellow. Leg I 3.06 long (0.88+0.25+0.78+0.70+0.45), IV 3.23 long (0.90+0.25+0.80+0.83+0.45). TmI 0.52. Abdomen 1.25 long, 0.85 wide, dorsally pale, with two indistinct grey longitudinal stripes. Epigyne as in Fig. 85: Two narrow, long, sclerotized, parallel stripes present on cuticle at both sides of median plate. Median plate wider than long,

receptacles small, oblong. Body and leg coloration, as well as chaetotaxy, as in male.

Taxonomic remarks: The new species is similar to *O. uncus* sp. nov. (see below).

Distribution: At present only known from Kerala and Madras (currently Tamil Nadu), India.

***Oedothorax uncus* sp. nov.**

Figs 86-88

Holotype: Male; INDIA, Meghalaya, Khasi Hills, Mawphlang, 1800 m a.s.l., forest, sifting litter; 28.X.1978; leg. C. Besuchet & I. Löbl [1978/32b].

Paratype: 1 female, collected together with the holotype.

Etymology: The species name is a Latin noun meaning “hook”; it refers to the shape of the distal apophysis of the convector.

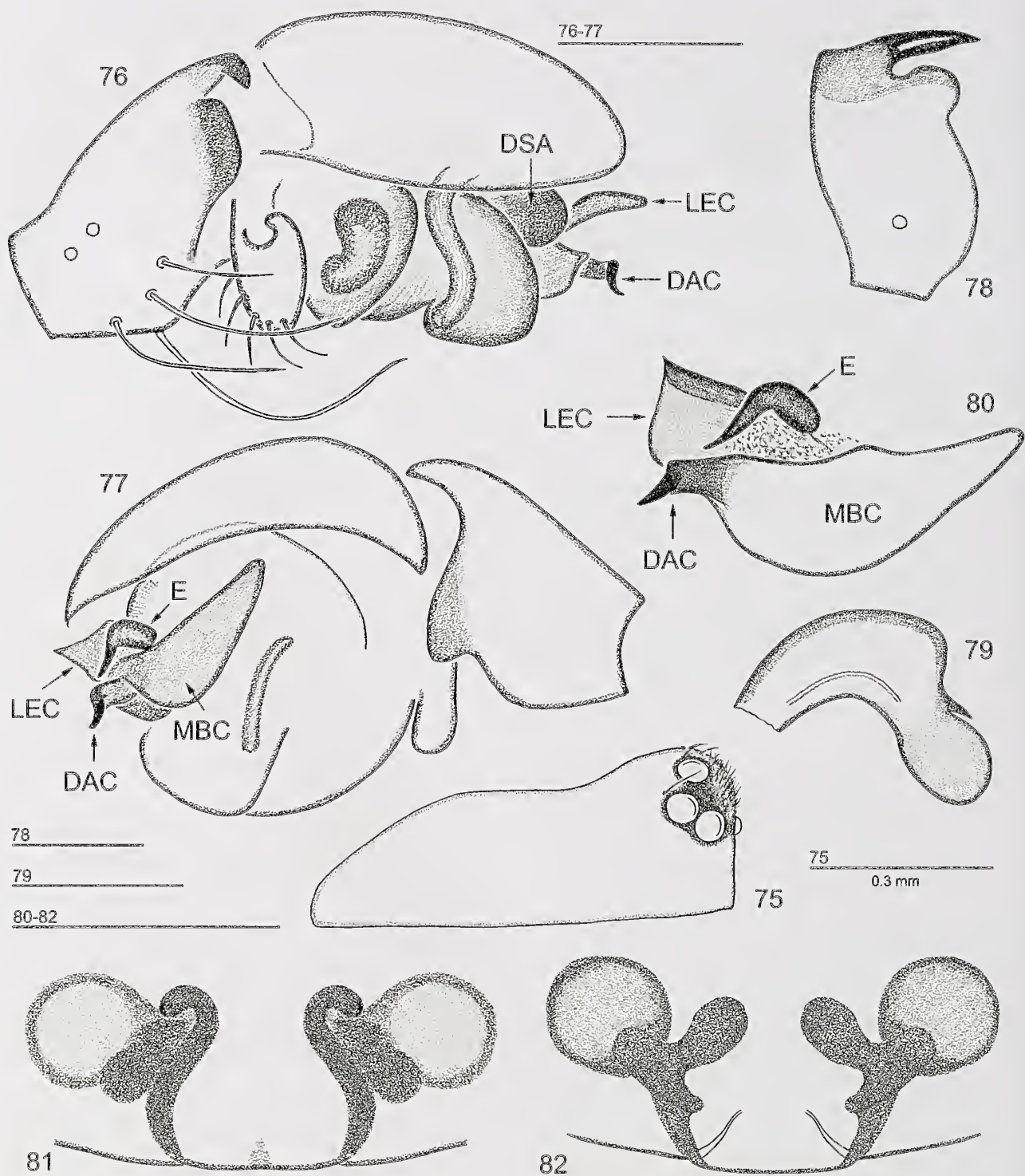
Diagnosis: The new species can be easily distinguished by the long, hook-shaped distal apophysis of the convector in males, as well as by the anchoriform median plate of the epigyne in females.

Description: Male (holotype). Total length 2.25. Carapace 0.98 long, 0.80 wide, unmodified, yellow with indistinct grey radial stripes. Chelicerae 0.50 long. Legs yellow. Leg I 3.78 long (0.95+0.30+1.00+0.88+0.65), IV 2.88 long (0.80+0.25+0.70+0.73+0.40). Chaetotaxy 2.2.1.1, spines stout, their length 1.5-2.5 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.68. Palp (Figs 86-87): Tibia elongated dorsally, with several small denticles apically. Paracymbium simple, hook-shaped. Frontal surface of tegulum membranous. Distal suprategular apophysis short, rounded distally. Embolus very small, embolus proper short, obtuse. Distal apophysis of convector long, curved, gradually narrowing and strongly projecting. Abdomen 1.18 long, 0.83 wide, dorsally pale, with two pairs of isolated grey spots in anterior part and several merging grey spots posteriorly.

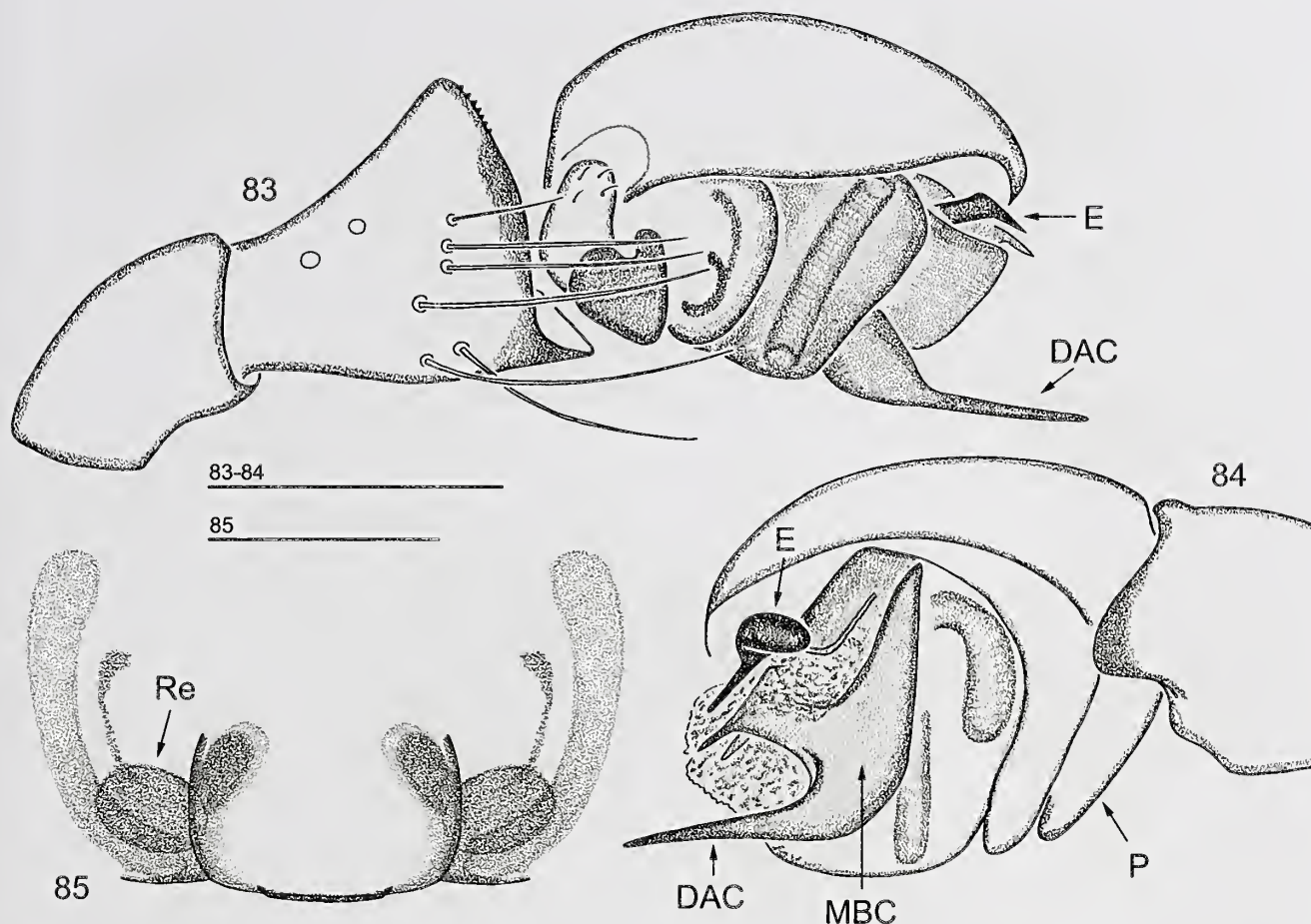
Female. Total length 2.30. Carapace 1.00 long, 0.78 wide, unmodified. Chelicerae 0.45 long, unmodified. Leg I 3.52 long (0.93+0.30+0.88+0.88+0.53), IV 3.73 long (1.08+0.30+0.90+0.95+0.50). TmI 0.68. Abdomen 1.18 long, 0.75 wide. Epigyne as in Fig. 88: median plate wider than long. Body and leg coloration, as well as chaetotaxy, as in male.

Taxonomic remarks: The new species is similar to *O. stylus* sp. nov., but clearly differs by the presence of a dorsal outgrowth on the palpal tibia, and by the hook-shaped distal apophysis of the convector in the male, as well as by the absence of narrow, long, sclerotized, parallel stripes at both sides of the median plate of the epigyne in the female.

Distribution: Only known from the type locality.



Figs 75-82. *Oedothorax rusticus* sp. nov., male (75-80) and female (81-82) paratypes. (75) Carapace, lateral view. (76-77) Right palp, retro- and prolateral views, respectively. (78) Palpal tibia, dorsal view. (79) Distal suprategular apophysis. (80) Embolic division. (81-82) Epigyne, ventral and dorsal views, respectively.



Figs 83-85. *Oedothorax stylus* sp. nov., male holotype (83-84), female paratype (85). (83-84) Right palp, retro- and pro-lateral views, respectively. (85) Epigyne, ventral view.

***Oedothorax villosus* sp. nov.**

Figs 89-99

Holotype: Male; INDIA, Himalayas, West Bengal, Darjeeling Distr., Algarah, 1800 m a.s.l., sifting in forest; 9.X.1978; leg. C. Besuchet & I. Löbl [#6].

Paratypes: 2 males, 2 females, collected together with the holotype.

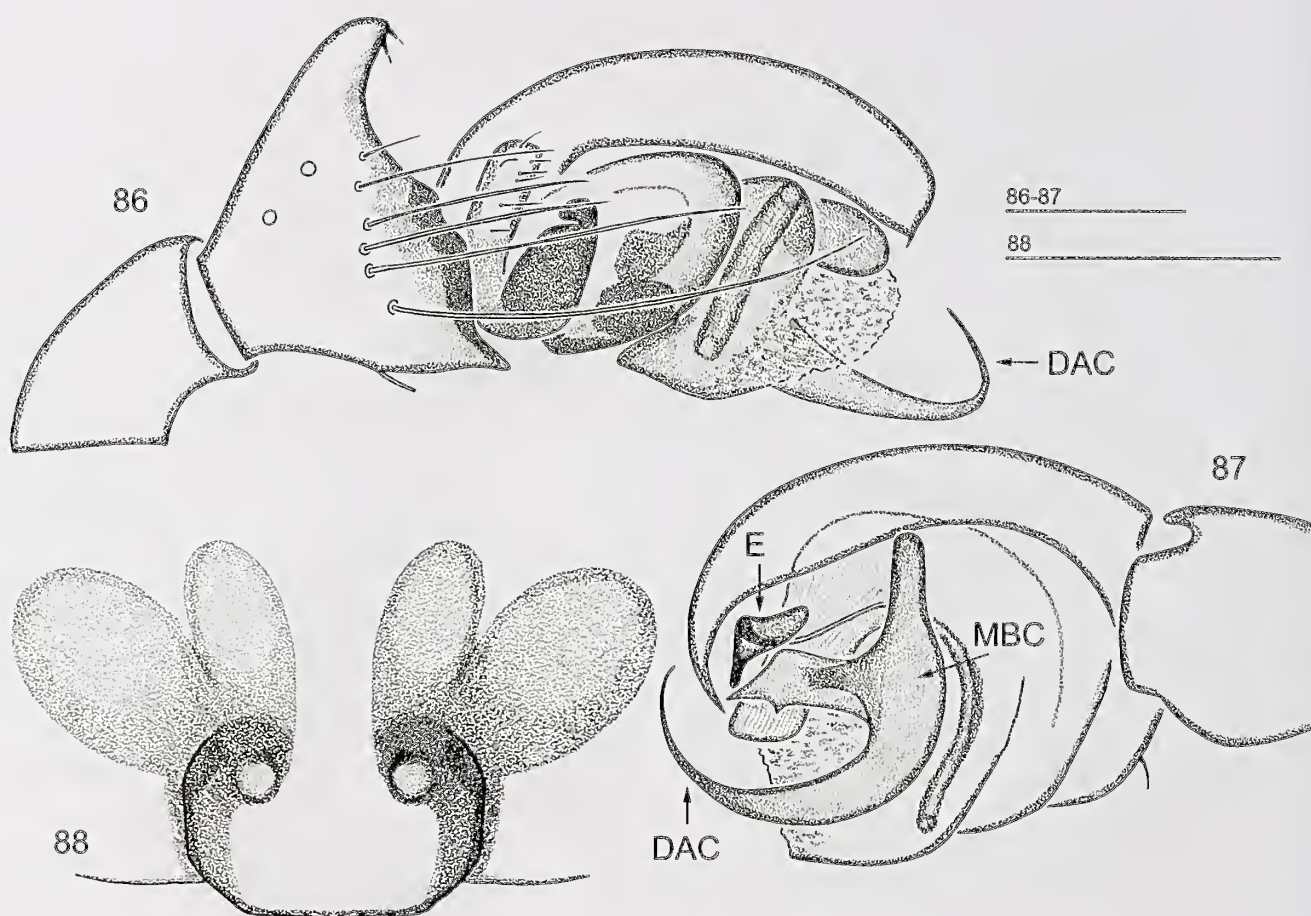
Diagnosis: The new species is characterized by the strongly modified male carapace, which carries a pair of short, thick, curved setae resembling horns behind the eyes and two small sharp projections on the back side of the semiglobular postoeular elevation.

Etymology: The specific name is a Latin adjective meaning "hairy", referring to the hirsuteness of the sternum and abdomen in both sexes.

Description: Male (paratype). Total length 2.00 (2.05 in one other paratype). Carapace 0.90 long, 0.78 wide, pale brown with indistinct grey radial stripes, strongly modified. Cephalic part of carapace with a pair of curved, horn-shaped setae behind posterior median eyes; a pale semiglobular postocular elevation

bearing two small sharp projections on its back side; remaining part of carapace conically prominent (Figs 89-91). Chelicerae 0.35 long, unmodified. Sternum bearing three long hairs. Legs yellow. Leg I 3.96 long ($1.10+0.28+1.00+0.95+0.63$), IV 3.87 long ($1.08+0.25+0.98+1.03+0.53$). Chaetotaxy 2.2.1.1, length of spines 1.5-2.5 times diameter of segment. All metatarsi with a trichobothrium. TmI 0.75. Palp (Figs 92-97): Tibia short, with a strong, stiletto-like apical apophysis directed retrolaterally. Paracymbium relatively small, hook-shaped. Distal suprattegular apophysis flat, pointed apically, with a small sharp tooth medially. Embolus small, bent at 90° , its radical part slightly expanded. Convictor elongated, narrow, slightly curved in middle; lateral extension flat, flag-shaped, situated distally. Abdomen 1.10 long, 0.75 wide, bearing thin and long hairs, dorsally pale, with two pairs of irregular grey spots in anterior part and several transversal stripes posteriorly.

Female. Total length 2.23 (2.33 in other paratype). Carapace 0.95 long, 0.75 wide, unmodified. Chelicerae 0.38 long. Leg I 3.48 long ($0.95+0.25+0.90+0.83+0.55$), IV 3.58 long ($1.00+0.25+0.90+0.93+0.50$). TmI 0.75. Abdomen 1.38 long, 0.88 wide. Epigyne as in Figs 98-



Figs 86-88. *Oedothorax uncus* sp. nov., male holotype (86-87), female paratype (88). (86-87) Right palp, retro- and prolateral views, respectively. (88) Epigyne, ventral view.

99: median plate with inclined lateral sides, receptacles small, oblong. Body and leg coloration, as well as chaetotaxy, as in male.

Variability: The shape of the male carapace is similar in all specimens examined; only slight differences can be observed in the roundness of the postocular cephalic elevation and in the size of the sharp projections on its back side.

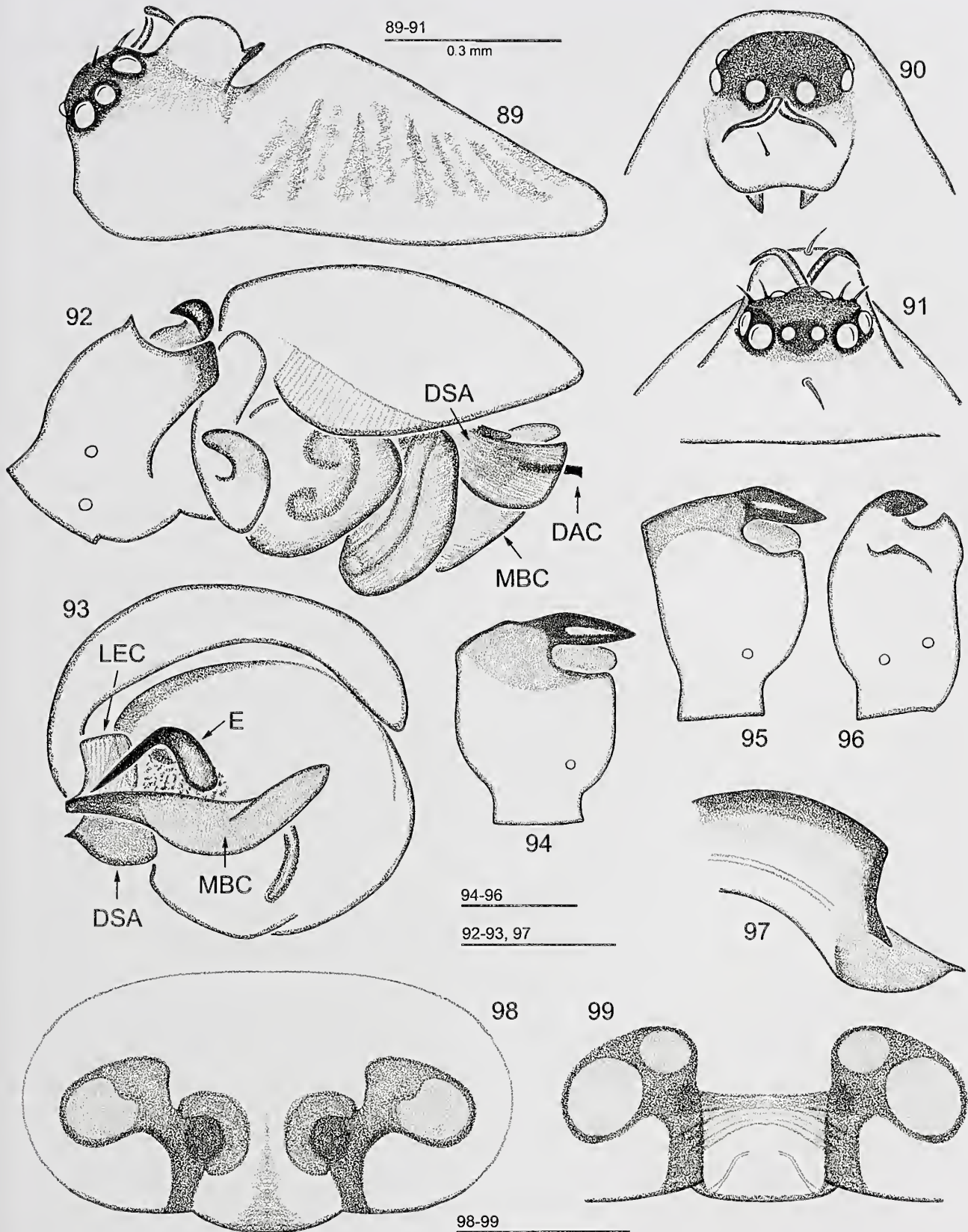
Taxonomic remarks: The new species is similar to *O. cornutus* sp. nov. (see above), distinguished by the longer, not appressed horn-shaped setae; by the position of the carapace slit which is situated behind of the postocular elevation, while in *O. cornutus* the slit is before that; by the thicker stiletto-like tibial apophysis of the male palp, as well as by the oblong receptacula in females, while in *O. cornutus* receptacula are almost spherical.

Distribution: Only known from the type locality.

CONCLUSION

The present study adds four new species to the genus *Oedothorax* in the Himalayan region, which currently contains no fewer than 27 species. This is substantially more than in the remaining Palaearctic (22 species). When disregarding such “problematic” species like *O. caporiaccoi* Roewer, 1942, *O. insignis* (Bösenberg, 1902), *O. insulanus* Paik, 1980, *O. japonicus* Kishida, 1910, *O. tener* (Bösenberg, 1902) and some others, the Himalayan centre of *Oedothorax* speciation appears to be even more significant. The Oriental *Oedothorax* fauna currently comprises eight species, i.e. seven described here from Meghalaya, Madras and Kerala, as well as *O. convector* Tanasevitch, 2014 from Thailand (Tanasevitch, 2014a). All Oriental species of the genus were found on mountains at 900-2150 m a.s.l.

Interestingly, all Himalayan and Oriental *Oedothorax* species are distinguished from the Palaearctic congeners by the development of a distinct dorsal abdominal pattern (see Figs 9-15); the extra-Himalayan Palaearctic representatives show only a light longitudinal stripe on a grey dorsal side of the abdomen at best.



Figs 89-99. *Oedothorax villosus* sp. nov., male (89-97) and female paratype (98-99) paratypes. (89-91) Carapace, lateral, dorsal and frontal views, respectively. (92-93) Right palp, retro- and prolateral views, respectively. (94-96) Palpal tibia, dorsal view, different aspects. (97) Distal suprategular apophysis. (98-99) Epigyne, ventral and dorsal views, respectively.

Changes in colour or appearance of the dorsal abdominal pattern in the eastern populations of some Palaearctic taxa are long known from linyphiids. For example, the East Palaearctic populations of *Kaestneria pullata* (O. P.-Cambridge, 1863) differ from the West Palaearctic ones by a yellowish orange tinge of the carapace and legs. Eventually, this led Kulczyński (1885) to describe the Kamchatka population of *K. pullata* as a new species, *K. anceps* Kulczyński, 1885. Amplification or the appearance of a pattern is also known in some Micronetinae, e.g. *Agyneta mollis* (O. P.-Cambridge, 1871). In addition to the peculiar coloration, most Himalayan and Oriental species show a lateral extension on the convector, a character which is rather rare among other extra-Himalayan *Oedothorax*.

The above two characters of Himalayan *Oedothorax*, i.e., an abdominal pattern and the presence of a lateral extension on the convector, coupled with their geographical proximity to Oriental congeners, indicate that the Himalayan centre of *Oedothorax* speciation is closely related to the Oriental fauna. It is the Himalayas that seem to have supplied faunal elements for the Oriental region.

ACKNOWLEDGEMENTS

I am most grateful to all persons whose collections have been used in the present study. Special thanks go to Peter Schwendinger (MHNG, Switzerland) for the opportunity to work with the collections of the MHNG and for his valuable comments on the manuscript. I also appreciate Jörg Wunderlich's (Hirschberg, Germany) help by reviewing the manuscript.

REFERENCES

- Bösenberg W. 1902. Die Spinnen Deutschlands. II-IV. *Zoologica (Stuttgart)* 14: 97-384.
- Cambridge O. P.- 1863. Description of twenty-four new species of spiders lately discovered in Dorsetshire and Hampshire; together with a list of rare and some other hitherto unrecorded British spiders. *Zoologist* 21: 8561-8599.
- Cambridge O. P.- 1871. Descriptions of some British spiders new to science, with a notice of others, of which some are now for the first time recorded as British species. *Transactions of the Linnean Society of London* 27: 393-464.
- Förster A., Bertkau P. 1883. Beiträge zur Kenntniss der Spinnenfauna der Rheinprovinz. *Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westfalens* 40: 205-278.
- Hormiga G. 2000. Higher level phylogenetics of erigonine spiders (Araneae, Linyphiidae, Erigoninae). *Smithsonian Contributions to Zoology* 609: 1-160.
- Kishida K. 1910. Supplementary notes on Japanese spiders. *Hakubutsu-gaku Zasshi* 118: 1-9.
- Kulczyński W. 1885. Araneae in Camschadalia a Dre B. Dybowski collectae. *Pamiętnik Akademji umiejtnosci w Krakow wydział matematyczno-przyrodniczy* 11: 1-60.
- Merrett P. 1963. The palpus of male spiders of the family Linyphiidae. *Proceedings of the Zoological Society of London* 140: 347-467.
- Paik K.Y. 1980. The spider fauna of Dae Heuksan-do Isl., So Heuksan-do Isl. and Hong-do Isl., Jeonlanam-do, Korea. *Kyungpook Educational Forum Kyungpook National University* 22: 153-173.
- Roewer C.F. 1942. Katalog der Araneae von 1758 bis 1940. I. *Paul Budy, Bremen*, VIII + 1040 pp.
- Scharff N. 1989. New species and records of afrotropical Linyphiidae (Araneae). *Bulletin of the British Arachnological Society* 8: 13-20.
- Tanasevitch A.V. 1987. The linyphiid spiders of the Caucasus, USSR (Arachnida: Araneae: Linyphiidae). *Senckenbergiana Biologica* 67: 297-383.
- Tanasevitch A.V. 1998. New *Oedothorax* Bertkau, 1883 from Nepal (Arachnida, Araneae, Linyphiidae). *Bonner Zoologische Beiträge* 47(3-4): 429-441.
- Tanasevitch A.V. 2014a. New species and records of linyphiid spiders from Laos (Araneae, Linyphiidae). *Zootaxa* 3841 (1): 67-89.
- Tanasevitch A.V. 2014b. On the linyphiid spiders from Thailand and West Malaysia (Arachnida: Aranei: Linyphiidae). *Arthropoda Selecta* 23(4): 393-414.
- World Spider Catalog 2015. World spider catalog, version 16. Natural History Museum Bern. Available at <http://wsc.nmbe.ch> (accessed 2015).